

Should this result, when tested by a wider range of observation, hold good, it will afford a very valuable and easily obtainable isothermal, and also enable one to estimate the height of the timber line from thermometric stations at the bases of mountain ranges.—HENRY GANNETT in *Am. Jour. Sci.*

**A Colossal Album of Living Ferns**, by J. G. Lemmon.—Explorers in mountainous countries sometimes encounter what the frontier's-men call "rock-traps"; if on the Pacific coast, "box-canyons."

Generally terminating a ravine, and with high precipitous walls on either hand, they bar farther ascent, and the explorer has no choice but to retreat.

If, however, the party is a lover of Nature he is apt to pause and examine these *cul-de-sacs* with more or less of interest and profit. These box-canyons sometimes may be likened to immense half-opened books, resting on end and slightly inclined against a mountain.

Occasionally a tier of them may be found encircling the top of a mountain like a revolving book-rack in a reference library. In these ponderous tomes of Nature's original scriptures what solid, fundamental, pre-historic facts may be read by the educated mind. The geologist is sure to discover remarkable placements of rock-strata, or the no less interesting omission of normal relations. The paleontologist may discover shells, casts of fossil parts of animals and plants as he shatters the rocks with his hammer.

If in a reputed region of the precious metals, the first to explore minutely, these open volumes, is the eager, intrepid prospector, gladly availing himself of the chance to examine without the aid of pick and shovel, the exposed rocks to trace, if any there be, the indications of ore. The zoologist will often find rare insects, reptiles, birds or beasts haunting these secluded places.

But if a stream of water cascades down the chasm or even if enough trickles over the walls to keep the interstices moist, the botanist, more than all others, will be certain to find much of interest in the peculiar flora which these conditions always produce.

It is such a secluded, magnificent and well-watered natural conservatory, like a colossal album of living plants, that the writer discovered last week, here in the heart of the lofty, rock-ribbed, heavily-forested Huachuca mountains of southern Arizona. The results of the adventure may justify a detailed description.

It was about 11 A. M. of a hot August day, when as I turned an angle of a deep ravine, a stupendous gorge opened before me not 20 rods distant, its dark, vertical walls over 2,000 feet high, seamed and furrowed laterally and vertically; these containing rank on rank of plants of various size and hue, while over all water dripped in a shower of pearls.

The grandeur of the scene fixed me to the spot for a moment

How magnificently the rock-ledges up-rose on either hand! Granite, gneiss, porphyry, feldspar, trap, quartz, limestone, syenite and slate were superposed in varied degrees of thickness and projection, all tinted with their characteristic colors and decked off with wreaths of superb flowers.

As I neared the open volume I detected irregularities of the sides as if the pages were crumpled or plaited. Nearing the entrance the right-hand page was found to be composed of a long series of upright divisions all hinged together by vertical depressions like a segmented panorama or series of pictures which one folds between covers for safe transportation; the left-hand page had fewer but grander swelling folds and all were richly decorated with flowers and ferns many of which I had never seen before. How charming was this nearer view! For vignettes on the lower margin of the pages there is, on the right a row of lovely maples just now shedding their double-oared seeds; on the left, a row of thrifty walnut trees bending with yellowing fruit.

Penetrating to the inner angle of the enclosure where all the water pearls unite to form a rivulet I scanned the almost vertical walls to determine if they could be scaled. The discovery in the first horizontal fissure of a rare and beautiful fern (*Aspidium juglandifolium*) that has not before been found west of Texas, decided me to make the attempt, even if I had to return to camp for ropes and let down a knotted one from the top the next day. But excited by the prospects ahead I hastily divested myself of all weight possible, but retaining portfolio and pick, I assaulted the rock-barriers. Slight projections occurred at long intervals, cavities were dug in the soft sandstone for fingers, then toes, while fortunately, over the thickest ledges of jutting rocks such bushes as dwarf oak and evergreen sumac often trailed their branches within reach.

Gaining the second landing a new flower was discovered and another rare shield-fern (species unknown). With increased toil and peril the third narrow bench was reached at an elevation of about 100 feet. Two more ferns—one of them new (a *Cheilanthes*)—with several other novelties were found peeping out from the clefts as if to welcome the intruder and invite his gathering hand.

How much these discoveries stimulated to continued efforts, and blinded the judgment to probable disastrous consequences I leave my young botanical brothers to imagine. At the next resting place which was a little wider ledge than the preceding, I was well nigh exhausted and was perspiring profusely, but before I had an opportunity to settle myself on a narrow seat another most beautiful and rare fern was detected! It was now long after noon and as this vast conservatory was on the east side of the mountain the sun was hidden and the cold descending winds chilled me to shivering.

But other rare or even new ferns might be awaiting, besides

now, perhaps it was easier clambering out over the top than to return. At about half way up, say 1000 feet altitude a ledge of two to six feet wide occurs, and here hundreds of species of shrubs, herbs, ferns, mosses and lichens crowd the broadened bench in a most robust form and highest colors. A lovely, motley-leaved plant (*Heuchera sanguinea*) resembling a geranium thrusts long racemes of bright red, star flowers from the crevices. A golden *Silene* (*S. laciniata*) with large lacerated petals and a curious *Draba* (*D. streptocarpa*) with yellow flowers and curled pods cling to the damp wall. Dr. Parry's new and beautiful lily vies with the golden columbine in flaunting a profusion of rich color. White-faced strangers with purple Lobelias commingle their lives, while beneath all, a noble shield-fern, a modest lip-fern, and a delicate spleen-wort—all new to the region—formed an exhilarating climax to discovery, and rendered the toiler totally irresponsible.

Above this ledge the walls are deeper, the foot-holes and trailing bushes less frequent, so progress became more difficult and dangerous. But the strange plants still appeared at every cleft. At about 4 o'clock P. M. I had arrived near to the top and felt triumphant and elated. Already I regarded myself safe and recalled the number of ferns crammed into my portfolio which now weighed about 15 pounds and was securely strapped to my back. There were twenty-seven species and several very marked varieties! When it is considered that only 80 species are yet known to science in all N. America, to find one-third of the number growing in one rocky album, however large, is enough to turn an ambitious botanist's head.

Tired, bruised, exhausted and shivering I drew myself slowly up to the last crevice, to be amazed and stunned at seeing the uppermost stratum which was of slate and about 50 feet thick juttet out 1 to 5 feet over the wall on either hand.

There was no recourse but to return. How frightful was the yawning chasin now that I had to face it! How tremulous were my bending knees! Experienced cragsmen the world over will tell you that it is far easier to climb up than to descend a wall of rocks. You cannot see the foot-holds or avail yourself of bushes when they are below you.

Once the slight projection that half-received my nailed boot proved a thin shell of rock and I fell ten feet to the next ledge, landing on my shoulders; my outspread arms luckily clutched a spiny bush on one side, and a prickly cactus on the other, else I would have fallen over 1,500 feet. This accident banished the ferns for the nonce from consideration and determined me to seek an exit from the trap by a side passage if such could be found. Side stepping with great care along on each ledge as far as possible before returning to the center I examined each of them in order but with no success until the broadest ledge about half way down was reached. Here on the left, the ledge extended like a bridge

trail across the folds of the panorama described, in long, swinging curves in and out. It was often blocked up by debris or guarded by cactus or thorn bushes, but over or through these I struggled, passing fold after fold of the long series; a sheer precipice of 1,000 feet below, an equally high and steep one over head, the way often narrowed to a foot in width and in several places, seemingly impassable. In the desperate straits when the carrying of my heavy portfolio before me almost tipped me over, I was tempted to cast it away or at least to leave it in the path until refreshed by food and rest another day.

But this recreancy was but momentary, and now clutching the bundle tightly I would have fallen rather than relinquished it. At last with torn garments and lacerated flesh, with tottering steps and dizzy brain, obstacle after obstacle was surmounted and I stood—or rather fell forward—upon *terra firma*, saved!

Reporting adventures and showing trophies to Mrs. L. at night, she was seized with uncontrollable desire to look into the wonderful fern album too. So after resting and recuperating a day I conducted her—dressed properly for the occasion—up the mountain and admitted her by the side entrance, with the aid of hatchet and pick. Stouter hearts than woman's might have quailed at the imminent perils passed, but at the narrow places she faced the wall, carefully side-stepped along several feet, and so pressed forward. At every outward curve of the long course, there is a little landing, it may be of debris, or a clear space and here she caught glimpses of the radiant treasures in the center of the volume. Nearer and clearer they grew and louder and more emphatic were her exclamations of admiration and awe.

Though the trip was toilsome, and terrifying, and though we came near being caught by an Arizona cloud-burst so-called or sudden torrent that thundered down the gorge at a moments warning, yet she highly enjoyed the adventure and declared that in all her extensive travel this natural conservatory in grandeur and beauty exceeds any one object she has seen on the Pacific slope.

Rumors of the discovery having reached Fort Huachuca, 10 miles distant, two days after an officer with his lady drove out to our camp and I led him up to the conservatory and through the private entrance.

As we rounded the folds of the rock-wall, one after another, it was refreshing to witness his enthusiasm.

He is accustomed to target-firing and to measuring heights and his estimates of distances coincide with mine in the foregoing paragraphs.

Two days ago I sought to explore another box-canyon on the south side of the mountain. It is at a much higher elevation and is twice as large every way. I found several more rare ferns, but

late in the afternoon I became entrapped, and had to chance a slide down a limestone ledge of about 12 feet. A projection caught my left hand and broke one of the metacarpal bones in the palm of the hand, with a loud snap and much pain.

And this is why, my dear readers, being confined to camp, I have found the time out of our busy life, to scribble these lines for the GAZETTE. The doubtful ferns have been forwarded to Prof. Eaton for determination, and we hope next winter to be able to send out from our herbarium in Oakland, Cal., several new ferns gathered from our Colossal Fern Album.—*Huachuca Mts., Arizona.*

**Latent Vitality of Seeds.**—In the current number of the *Am. Jour. Sci.* Dr. Gray gives some account of the recent experiments of Van Tieghem and G. Bonnier to ascertain the effect of different conditions on the latent vitality of seed. Several packets of seeds, in January, 1880, were divided into three equal parts and placed under the following conditions: One was exposed to free air but screened from dust; another in closed air, being tightly corked up in a tube; the third in pure carbonic acid. At the end of two years the seeds were taken out, weighed and sown. The seeds exposed to free air had gained in weight; those in closed air had gained a very little; while those in carbonic acid gas hardly varied from their original weight. In regard to their germination, over 90 per cent. of the peas and beans kept in the free air germinated; 45 per cent. of the peas and only 2 per cent. of the beans kept in closed air germinated; while of those exposed to carbonic acid gas not one showed any vitality. In conclusion Dr. Gray remarks: "If the full course of experiments gives such results, it will (we should say) be made clear, 1st, that the vegetable embryo in the seed is not strictly speaking latent, but is doing some work, however little, is keeping up a respiration, which is essential to its continued life. 2, That the life of seeds cannot be indefinitely prolonged. *Very old* seeds exposed to the air must be dead by exhaustion, and those deeply buried, by suffocation; and the numerous recorded cases of the germination of ancient seeds are more and more to be distrusted."

***Trifolium hybridum*, L.**—This species of *Trifolium* was found growing at Montreal in August, and though perhaps not permanently established, yet deserves a place in our flora. The description of the species as given in Hooker's "Students' Flora of the British Islands," is given below, as it may be of use to identify the plant when found. It seems to be often introduced into England with the ordinary *T. repens*, and occasionally replaces it.

"*T. hybridum*, L.; almost glabrous, leaflets obovate or oblong, stipules oblong, tips triangular, heads axillary peduncled globose, pedicels elongate at length reflexed, flowers drooping, calyx-tube